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Toshimichi Makii

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AZ ELECTRONIC MATERIALS USA CORP.
ATTENTION: INDUSTRIAL PROPERTY DEPT.
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EXAMINER

EOFF, ANCA

ART UNIT

PAPER NUMBER

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/575,338	Applicant(s) MAKII ET AL.	
	Examiner ANCA EOF	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 November 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1, 5-6, 13-15 and 18-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,5,6,13-15 and 18-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Claims 1, 5-6, 13-15 and 18-20 are pending. Claims 2-4, 7-12 and 16-17 have been cancelled.
2. The foreign priority document JP 2003-373069, filed on October 31, 2003 was received and acknowledged. However, in order to benefit of the earlier filing date, a certified English translation is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
4. Claims 18-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 18-19 depend on claims 1 and 5 respectively and recite the limitation "said component (F)". There is insufficient antecedent basis for this limitation in claims 1 and 5.

For the purpose of examination on the merits, the compound (F) is not considered in claims 18-19.

Claim 20 depends on claim 6 and recites the limitation "said component (E)". There is insufficient antecedent basis for this limitation in claim 6. Claim 6 does not include component (E).

For the purpose of examination on the merits, the compound (E) is not considered to be included in claim 20.

Double Patenting

5. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

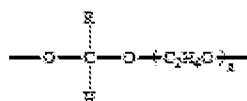
6. Claims 5 and 19 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-2 of U.S. Patent No. 7,255,972 in view of Sander et al. (US Patent 4,247,611).

With regard to claims 5 and 19, US Patent 7,255,972 claims a chemically amplified positive-working photosensitive composition comprising:

(A) an alkali soluble novolak resin;

(B) an alkali soluble acrylic resin, which contains a structural unit derived from a hydroxylalkyl methacrylate and a structural unit derived from an alkyl acrylate and optionally a structural unit derived from styrene;

(C) an acetal compound, which has a structural unit represented by the formula (I):



(I), wherein R represents a saturated alkyl group having 1 to 20 carbon atoms and n is an integer from 1 to 10, and

(D) an acid generator (see claims 1 and 2).

However, US Patent 7,255,972 does not claim a photosensitizing agent containing a quinonediazide group.

Sander et al. disclose a radiation-sensitive composition comprising:

(a) a compound which forms an acid under the influence of actinic radiation and
(b) an organic polymeric compound which contains recurring acetal or ketal groupings in its main chain and whose solubility in a liquid developer is increased by the action of an acid (abstract and column 1, lines 6-11). This composition acts as positive-working composition (column 8, lines 22-23).

Sander et al. disclose that naphthoquinone-1,2-diazide-4-sulfochloride is preferred for use as radiation sensitive compound because, during its exposure, three acid functions are formed which give rise to a relatively high degree of intensification during splitting of polyacetals and polyketals (column 9, lines 30-34).

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Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use naphthoquinone-1,2-diazide-4-sulfochloride in the composition of US Patent 7,255,972 because, during its exposure, three acid functions are formed which give rise to a relatively high degree of intensification during splitting of polyacetals and polyketals.

Sander et al. further disclose that the radiation sensitive compounds may be used in an amount of 0.1-10 % by weight based on the total weight of the solids (column 10, lines 14-17). The alkali-soluble novolak resins present in the composition are in an amount of 30-90 % by weight based on the total weight of the solids (column 8, lines 54-58).

The ratio of novolak resin : naphthoquinone-1,2-diazide-4-sulfochloride is 100: 0.033 to 11.11, which is in the range alkali soluble resin (A) : photosensitizing agent (D) of the instant application.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 1 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sander et al. (US Patent 4,247,611).

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With regard to claim 1, Sander et al. disclose a radiation-sensitive composition comprising:

(a) a compound which forms an acid under the influence of actinic radiation, and
(b) an organic polymeric compound which contains recurring acetal or ketal groupings in its main chain and whose solubility in a liquid developer is increased by the action of an acid, wherein the developer may be a weak alkaline solution (column 1, lines 55-60 and column 2, lines 3-4).

Sander et al. disclose that this composition acts as positive-working composition (column 8, lines 22-23).

Sander et al. further disclose that the composition may comprise a binder, such as a novolak resin (column 8, lines 28-38), equivalent to the alkali-soluble novolak resin (A) of the instant application.

Sander et al. further disclose that other alkali-soluble resin, such as a copolymer of methyl methacrylate and methacrylic acid may be used (column 8, lines 52-54). This copolymer is equivalent to the alkali-soluble acrylic resin (E), which contains a structural unit derived from a (meth)acrylic acid and a structural unit derived from an alkyl methacrylate of the instant application.

Sander et al. do not disclose that mixture of alkali-soluble resins may be used in the composition. However, it would have been obvious to one of ordinary skill in the art at the time of the invention to use more than one alkali-soluble resin, for the same purpose.

"It is prima facie obvious to combine two compositions each of which is taught by the prior art to be useful for the same purpose, in order to form a third composition to be used for the very same purpose.... [T]he idea of

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combining them flows logically from their having been individually taught in the prior art." *In re Kerkhoven*, 626 F.2d 846, 850, 205 USPQ 1069, 1072 (CCPA 1980) (citations omitted) (MPEP 2144.06 Art Recognized Equivalence for the Same Purpose)

Sander et al. further disclose that the polymeric compounds containing recurring acetal groups are polycondensation products containing recurring units obtained by reacting aldehydes $R_1\text{-CHO}$ or acetals $R_1\text{CH(OR}_7)_2$ with diols $\text{HO-R}_3\text{-OH}$, wherein R_1 is an alkyl groups with 1-12 carbon atoms, R_7 is an alkyl group with 1-6 carbon atoms (column 3, lines 10-33).

Sander et al. do not specifically teach the polymer with the acetal unit of formula (I) of the instant application.

However, it would have been obvious to one of ordinary skill in the art at time of the invention to obtain such a polymer, based on Sander's teaching that an aldehyde $R_1\text{-CHO}$ reacts with an diol $\text{HO-R}_3\text{-OH}$ to form a polymeric structure with acetal units.

A specific example of the aldehyde $R_1\text{-CHO}$ is n-butanal (column 3, line 54). This is equivalent to the aldehyde $R\text{-CHO}$ of the instant application, wherein R is a propyl group.

A specific example of the diol $\text{HO-R}_3\text{-OH}$ are polyethylene glycols with average molecular weights between 200 and 600 (column 4, lines 21-22). These compounds are equivalent to the compound of formula $\text{HO-(C}_2\text{H}_4\text{O)}_n\text{-H}$ of the instant application, wherein n may be an integer between 4 and 10.

The polycondensation product of n-butanal and the above-mentioned polyethylene glycol will be equivalent to the unit of formula (I), wherein R is a propyl group and n is an integer from 4 to 10.

The examiner would like to point out that the specification of the instant application also teaches that a polymer comprising a unit of formula (I) may be obtained by reacting an aldehyde $RCHO$ or an acetal $RCH(OR')_2$ with a polyethleneglycol of formula $HO-(C_2H_4O)_n-H$, wherein $n=1-10$ (page 9, lines 2-10).

Sander et al. further disclose that the composition may be comprise compounds such as sulfonium salts, iodonium salts, halogen containing compounds (column 9, lines 5-11), which are equivalent to the acid generating compound (C) of the instant application, as disclosed on page 11 of the specification.

Sander et al. disclose that naphthoquinone-1,2-diazide-4-sulfochloride is preferred for use as radiation sensitive compound because, during its exposure, three acid functions are formed which give rise to a relatively high degree of intensification during splitting of polyacetals and polyketals (column 9, lines 30-34). Sander et al. further disclose that the radiation-sensitive compounds may be used as mixtures (column 9, line 5).

The naphthoquinone-1,2-diazide-4-sulfochloride is equivalent to the photosensitizing agent (D) of the instant application.

With regard to claim 18, Sander et al. disclose that the alkali-soluble resin may be comprised in the composition in an amount of 30-90 % by weight based on the solid content (column 8, lines 54-57).

When novolak resins and acrylic resins are used in the composition, the ration novolak resin : acrylic resin is expected to be 100:100, which is in the range of the instant application for novolak resin (A): acrylic resin (E).

Sander et al. further disclose that the radiation sensitive compounds may be used in an amount of 0.1-10 % by weight based on the total weight of the solids (column 10, lines 14-17). Therefore the ratio of novolak resin : naphthoquinone-1,2-diazide-4-sulfochloride is 100: 0.033 to 11.11, which is in the range alkali soluble resin (A) : photosensitizing agent (D) of the instant application. Also, the ratio of novolak resin : acid generator is 100: 0.033 to 11.11, which is in the range alkali soluble resin (A) : acid generator (C) of the instant application.

Sander et al. teach a composition wherein the polymer with acetal units is comprised in an amount of 29 parts per 100 parts of alkali-soluble novolak resin (see Example 1 in column 20, lines 15-31). This value is within the range of novolak resin (A): polymer with acetal groups (B) of the instant application.

9. Claims 5 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sander et al. (US Patent 4,247,611) in view of Hatanaka et al. (WO 03/087941, wherein the citations are from the English equivalent document US Pg-Pub 2005/0147914).

With regard to claim 5, Sander et al. disclose a radiation-sensitive composition comprising:

- (a) a compound which forms an acid under the influence of actinic radiation, and
- (b) an organic polymeric compound which contains recurring acetal or ketal groupings in its main chain and whose solubility in a liquid developer is increased by the action of an acid, wherein the developer may be a weak alkaline solution (column 1, lines 55-60 and column 2, lines 3-4).

Sander et al. disclose that this composition acts as positive-working composition (column 8, lines 22-23).

Sander et al. further disclose that the composition may comprise a binder such as a novolak resin (column 8, lines 28-38), equivalent to the alkali-soluble novolak resin (A) of the instant application.

Sander et al. disclose that additionally, other alkali-soluble polymers such as polyacrylates which can be modified by comonomers may be added (column 8, lines 58-62), but fail to specifically disclose the copolymer (E) of the instant application.

Hatanaka et al. disclose a positive resist composition comprising an alkali-soluble resin (abstract), wherein the alkali-soluble resin may comprise a hydroxyethylmethacrylate unit and a methyl methacrylate unit (par.0059, par.0075). A positive resist comprising such copolymer leads to a pattern with good properties (par.0077).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use a copolymer comprising a hydroxyethylmethacrylate unit and a methyl methacrylate unit, as taught by Hatanaka et al., as alkali-soluble resin in the composition of Sander et al., with a reasonable expectation of success.

A copolymer comprising a hydroxyethylmethacrylate unit and a methyl methacrylate unit is equivalent to the acrylic resin (E) of the instant application.

Sander et al. further disclose that the polymeric compounds containing recurring acetal groups are polycondensation products containing recurring units obtained by reacting aldehydes $R_1\text{-CHO}$ or acetals $R_1\text{CH(OR}_7)_2$ with diols $\text{HO-R}_3\text{-OH}$, wherein R_1 is

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an alkyl groups with 1-12 carbon atoms, R_7 is an alkyl group with 1-6 carbon atoms (column 3, lines 10-33).

Sander et al. do not specifically teach the polymer with the acetal unit of formula (I) of the instant application. However, it would have been obvious to one of ordinary skill in the art at time of the invention to obtain such a polymer, based on Sander's teaching that an aldehyde $R_1\text{-CHO}$ reacts with a diol $\text{HO-R}_3\text{-OH}$ to form a polymeric structure with acetal units.

A specific example of the aldehyde $R_1\text{-CHO}$ is n-butanal (column 3, line 54). This is equivalent to the aldehyde $R\text{-CHO}$ of the instant application, wherein R is a propyl group.

A specific example of the diol $\text{HO-R}_3\text{-OH}$ are polyethylene glycols with average molecular weights between 200 and 600 (column 4, lines 21-22). These compounds are equivalent to the compound of formula $\text{HO-(C}_2\text{H}_4\text{O)}_n\text{-H}$ of the instant application, wherein n may be an integer between 4 and 10.

The polycondensation product of n-butanal and the above-mentioned polyethylene glycol will be equivalent to the unit of formula (I), wherein R is a propyl group and n is an integer from 4 to 10.

The examiner would like to point out that the specification of the instant application also teaches that a polymer comprising a unit of formula (I) may be obtained by reacting an aldehyde $R\text{CHO}$ or an acetal $R\text{CH(OR')}_2$ with a polyethleneglycol of formula $\text{HO-(C}_2\text{H}_4\text{O)}_n\text{-H}$, wherein $n=1-10$ (page 9, lines 2-10).

Sander et al. further disclose that the composition may be comprise compounds such as sulfonium salts, iodonium salts, halogen containing compounds (column 9, lines 5-11), which are equivalent to the acid generating compound (C) of the instant application, as disclosed on page 11 of the specification.

Sander et al. disclose that naphthoquinone-1,2-diazide-4-sulfochloride is preferred for use as radiation sensitive compound because, during its exposure, three acid functions are formed which give rise to a relatively high degree of intensification during splitting of polyacetals and polyketals (column 9, lines 30-34). Sander et al. further disclose that the radiation-sensitive compounds may be used as mixtures (column 9, line 5).

The naphthoquinone-1,2-diazide-4-sulfochloride is equivalent to the photosensitizing agent (D) of the instant application.

With regard to claim 19, Sander et al. disclose that the alkali-soluble resin may be comprised in the composition in an amount of 30-90 % by weight based on the solid content (column 8, lines 54-57).

When novolak resins and acrylic resins are used in the composition, the ration novolak resin : acrylic resin is expected to be 100:100, which is in the range of the instant application for novolak resin (A): acrylic resin (E).

Sander et al. further disclose that the radiation sensitive compounds may be used in an amount of 0.1-10 % by weight based on the total weight of the solids (column 10, lines 14-17). Therefore the ratio of novolak resin : naphthoquinone-1,2-diazide-4-sulfochloride is 100: 0.033 to 11.11, which is in the range alkali soluble resin (A) :

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photosensitizing agent (D) of the instant application. Also, the ratio of novolak resin : acid generator is 100: 0.033 to 11.11, which is in the range alkali soluble resin (A) : acid generator (C) of the instant application.

Sander et al. teach a composition wherein the polymer with acetal units is comprised in an amount of 29 parts per 100 parts of alkali-soluble novolak resin (see Example 1 in column 20, lines 15-31). This value is within the range of novola resin (A): polymer with acetal groups (B) of the instant application.

10. Claims 6 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sander et al. (US Patent 4,247,611) in view of Pai et al. (US Patent 5,648,194).

With regard to claim 1, Sander et al. disclose a radiation-sensitive composition comprising:

- (a) a compound which forms an acid under the influence of actinic radiation, and
- (b) an organic polymeric compound which contains recurring acetal or ketal groupings in its main chain and whose solubility in a liquid developer is increased by the action of an acid, wherein the developer may be a weak alkaline solution (column 1, lines 55-60 and column 2, lines 3-4).

Sander et al. disclose that this composition acts as positive-working composition (column 8, lines 22-23).

Sander et al. further disclose that the composition may comprise a binder such as a novolak resin (column 8, lines 28-38), equivalent to the alkali-soluble novolak resin (A) of the instant application.

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Sander et al. further disclose that the polymeric compounds containing recurring acetal groups are polycondensation products containing recurring units obtained by reacting aldehydes $R_1\text{-CHO}$ or acetals $R_1\text{CH(OR}_7)_2$ with diols $\text{HO-R}_3\text{-OH}$, wherein R_1 is an alkyl group with 1-12 carbon atoms, R_7 is an alkyl group with 1-6 carbon atoms (column 3, lines 10-33).

Sander et al. do not specifically teach the polymer with the acetal unit of formula (I) of the instant application.

However, it would have been obvious to one of ordinary skill in the art at time of the invention to obtain such a polymer, based on Sander's teaching that an aldehyde $R_1\text{-CHO}$ reacts with a diol $\text{HO-R}_3\text{-OH}$ to form a polymeric structure with acetal units.

A specific example of the aldehyde $R_1\text{-CHO}$ is n-butanal (column 3, line 54). This is equivalent to the aldehyde $R\text{-CHO}$ of the instant application, wherein R is a propyl group.

A specific example of the diol $\text{HO-R}_3\text{-OH}$ are polyethylene glycols with average molecular weights between 200 and 600 (column 4, lines 21-22). These compounds are equivalent to the compound of formula $\text{HO-(C}_2\text{H}_4\text{O)}_n\text{-H}$ of the instant application, wherein n may be an integer between 4 and 10.

The polycondensation product of n-butanal and the above-mentioned polyethylene glycol will be equivalent to the unit of formula (I), wherein R is a propyl group and n is an integer from 4 to 10.

The examiner would like to point out that the specification of the instant application also teaches that a polymer comprising a unit of formula (I) may be obtained

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by reacting an aldehyde $RCHO$ or an acetal $RCH(OR')_2$ with a polyethleneglycol of formula $HO-(C_2H_4O)_n-H$, wherein $n=1-10$ (page 9, lines 2-10).

Sander et al. further disclose that the composition may be comprise compounds such as sulfonium salts, iodonium salts, halogen containing compounds (column 9, lines 5-11), which are equivalent to the acid generating compound (C) of the instant application, as disclosed on page 11 of the specification.

Sander et al. disclose that naphthoquinone-1,2-diazide-4-sulfochloride is preferred for use as radiation sensitive compound because, during its exposure, three acid functions are formed which give rise to a relatively high degree of intensification during splitting of polyacetals and polyketals (column 9, lines 30-34). Sander et al. further disclose that the radiation-sensitive compounds may be used as mixtures (column 9, line 5).

The naphthoquinone-1,2-diazide-4-sulfochloride is equivalent to the photosensitizing agent (D) of the instant application.

However, Sander et al. fail to disclose that the positive resist composition may comprise a compound (F) with at least two vinyloxyalkylester groups.

Pai et al. disclose a photoresist composition comprising an alkali soluble resin, an o-naphthoquinone diazide sulfonic acid ester photoactive compound and a vinyl ether compound. The naphthoquinone diazide sulfonic acid is replaced in part with the vinyl ether composition to decrease the concentration of photoactive compound while increasing the photospeed of the composition (abstract and column 3, lines 13-17).

One of the naphthoquinone diazide sulfonic acid ester used in the composition of Pai et al. is 1,2-naphthoquinonediazide-4-sulfonic acid halide (column 4, line 11), which is equivalent to the naphthoquinone-1,2-diazide-4-sulfochloride of Sander et al.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use a vinylether in the composition of Sander et al., as taught by Pai et al., in order to decrease the amount of naphthoquinone-1,2-diazide-4-sulfochloride needed for the composition, while maintaining the image resolution and increasing the photospeed (Pai et al., column 3, lines 13-17).

Pai et al. further disclose that the vinylether compound may be bis(4-vinyloxybutyl)isophthalate, bis(4-vinyloxymethylcyclohexylmethyl)glutarate and bis(4-vinyloxybutyl)succinate (column 4, lines 63-65). These compounds are equivalent to the compound (F) with at least two vinyloxyalkylester groups of the instant application.

With regard to claim 20, Sander et al. disclose that the alkali-soluble resin may be comprised in the composition in an amount of 30-90 % by weight based on the solid content (column 8, lines 54-57).

Sander et al. further disclose that the radiation sensitive compounds may be used in an amount of 0.1-10 % by weight based on the total weight of the solids (column 10, lines 14-17). Therefore the ratio of novolak resin : naphthoquinone-1,2-diazide-4-sulfochloride is 100: 0.033 to 11.11, which is in the range alkali soluble resin (A) : photosensitizing agent (D) of the instant application. Also, the ratio of novolak resin : acid generator is 100: 0.033 to 11.11, which is in the range alkali soluble resin (A) : acid generator (C) of the instant application.

Sander et al. teach a composition wherein the polymer with acetal units is comprised in an amount of 29 parts per 100 parts of alkali-soluble novolak resin (see Example 1 in column 20, lines 15-31). This value is within the range of novola resin (A): polymer with acetal groups (B) of the instant application.

Pai et al. teach a composition comprising a novolak resin and a vinyl ether in a ratio of 100:16.66 (see column 6, lines 45-53), which is within the range of the instant application of novolak resin (A): component (F).

11. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sander et al. (US Patent 4,247,611) in view of Pai et al. (US Patent 5,648,194).

With regard to claim 13, Sander et al. disclose a radiation-sensitive composition comprising:

- (a) a compound which forms an acid under the influence of actinic radiation, and
- (b) an organic polymeric compound which contains recurring acetal or ketal groupings in its main chain and whose solubility in a liquid developer is increased by the action of an acid, wherein the developer may be a weak alkaline solution (column 1, lines 55-60 and column 2, lines 3-4).

Sander et al. disclose that this composition acts as positive-working composition (column 8, lines 22-23).

Sander et al. further disclose that the composition may comprise a binder such as a novolak resin (column 8, lines 28-38), equivalent to the alkali-soluble novolak resin (A) of the instant application.

Sander et al. further disclose that other alkali-soluble resin, such as a copolymer of methyl methacrylate and methacrylic acid may be used (column 8, lines 52-54). This copolymer is equivalent to the alkali-soluble acrylic resin (E) of the instant application.

Sander et al. do not disclose that mixture of alkali-soluble resins may be used in the composition. However, it would have been obvious to one of ordinary skill in the art at the time of the invention to use more than one alkali-soluble resin, for the same purpose.

"It is prima facie obvious to combine two compositions each of which is taught by the prior art to be useful for the same purpose, in order to form a third composition to be used for the very same purpose.... [T]he idea of combining them flows logically from their having been individually taught in the prior art." *In re Kerkhoven*, 626 F.2d 846, 850, 205 USPQ 1069, 1072 (CCPA 1980) (citations omitted) (MPEP 2144.06 Art Recognized Equivalence for the Same Purpose)

Sander et al. further disclose that the polymeric compounds containing recurring acetal groups are polycondensation products containing recurring units obtained by reacting aldehydes $R_1\text{-CHO}$ or acetals $R_1\text{CH(OR}_7)_2$ with diols $\text{HO-R}_3\text{-OH}$, wherein R_1 is an alkyl groups with 1-12 carbon atoms, R_7 is an alkyl group with 1-6 carbon atoms (column 3, lines 10-33).

Sander et al. do not specifically teach the polymer with the acetal unit of formula (I) of the instant application.

However, it would have been obvious to one of ordinary skill in the art at time of the invention to obtain such a polymer, based on Sander's teaching that an aldehyde $R_1\text{-CHO}$ reacts with an diol $\text{HO-R}_3\text{-OH}$ to form a polymeric structure with acetal units.

A specific example of the aldehyde $R_1\text{-CHO}$ is n-butanal (column 3, line 54). This is equivalent to the aldehyde $R\text{-CHO}$ of the instant application, wherein R is a propyl group.

A specific example of the diol $\text{HO-R}_3\text{-OH}$ are polyethylene glycols with average molecular weights between 200 and 600 (column 4, lines 21-22). These compounds are equivalent to the compound of formula $\text{HO-(C}_2\text{H}_4\text{O)}_n\text{-H}$ of the instant application, wherein n may be an integer between 4 and 10.

The polycondensation product of n-butanal and the above-mentioned polyethylene glycol will be equivalent to the unit of formula (I), wherein R is a propyl group and n is an integer from 4 to 10.

The examiner would like to point out that the specification of the instant application also teaches that a polymer comprising a unit of formula (I) may be obtained by reacting an aldehyde $R\text{CHO}$ or an acetal $R\text{CH(OR')}_2$ with a polyethleneglycol of formula $\text{HO-(C}_2\text{H}_4\text{O)}_n\text{-H}$, wherein $n=1\text{-}10$ (page 9, lines 2-10).

Sander et al. further disclose that the composition may comprise compounds such as sulfonium salts, iodonium salts, halogen containing compounds (column 9, lines 5-11), which are equivalent to the acid generating compound (C) of the instant application, as disclosed on page 11 of the specification.

Sander et al. disclose that naphthoquinone-1,2-diazide-4-sulfochloride is preferred for use as radiation sensitive compound because, during its exposure, three acid functions are formed which give rise to a relatively high degree of intensification during splitting of polyacetals and polyketals (column 9, lines 30-34). Sander et al.

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further disclose that the radiation-sensitive compounds may be used as mixtures (column 9, line 5).

The naphthoquinone-1,2-diazide-4-sulfochloride is equivalent to the photosensitizing agent (D) of the instant application.

However, Sander et al. fail to disclose that the positive resist composition may comprise a compound (F) with at least two vinyloxyalkylester groups.

Pai et al. disclose a photoresist composition comprising an alkali soluble resin, an o-naphthoquinone diazide sulfonic acid ester photoactive compound and a vinyl ether compound. The naphthoquinone diazide sulfonic acid is replaced in part with the vinyl ether composition to decrease the concentration of photoactive compound while increasing the photospeed of the composition (abstract and column 3, lines 13-17).

One of the naphthoquinone diazide sulfonic acid ester used in the composition of Pai et al. is 1,2-naphthoquinonediazide-4-sulfonic acid halide (column 4, line 11), which is equivalent to the naphthoquinone-1,2-diazide-4-sulfochloride of Sander et al.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use a vinyl ether in the composition of Sander et al., as taught by Pai et al., in order to decrease the amount of naphthoquinone-1,2-diazide-4-sulfochloride needed for the composition, while maintaining the image resolution and increasing the photospeed (Pai et al., column 3, lines 13-17).

Pai et al. further disclose that the vinyl ether compound may be bis(4-vinyloxybutyl)isophthalate, bis(4-vinyloxymethylcyclohexylmethyl)glutarate and bis(4-

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vinylxybutyl)succinate (column 4, lines 63-65). These compounds are equivalent to the compound (F) with at least two vinylxyalkylester groups of the instant application.

14. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sander et al. (US Patent 4,247,611) as applied to claim 1 and in further view of Pai et al. (US Patent 5,648,194).

With regard to claim 14, Sander et al. teach the composition of claim 1, wherein the composition comprises naphthoquinone-1,2-diazide-4-sulfochloride as radiation-sensitive compound (see paragraph 8 above). However, Sander et al. fail to disclose that the positive resist composition may comprise a compound (F) with at least two vinylxyalkylester groups.

Pai et al. disclose a photoresist composition comprising an alkali soluble resin, an o-naphthoquinone diazide sulfonic acid ester photoactive compound and a vinyl ether compound. The naphthoquinone diazide sulfonic acid is replaced in part with the vinyl ether composition to decrease the concentration of photoactive compound while increasing the photospeed of the composition (abstract and column 3, lines 13-17).

One of the naphthoquinone diazide sulfonic acid ester used in the composition of Pai et al. is 1,2-naphthoquinonediazide-4-sulfonic acid halide (column 4, line 11), which is equivalent to the naphthoquinone-1,2-diazide-4-sulfochloride of Sander et al.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use a vinyl ether in the composition of Sander et al., as taught by Pai et al., in order to decrease the amount of naphthoquinone-1,2-diazide-4-

sulfochloride needed for the composition, while maintaining the image resolution and increasing the photospeed (Pai et al., column 3, lines 13-17).

Pai et al. further disclose that the vinyl ether compound may be bis(4-vinyloxybutyl)isophthalate, bis(4-vinyloxymethylcyclohexylmethyl)glutarate and bis(4-vinyloxybutyl)succinate (column 4, lines 63-65). These compounds are equivalent to the compound (F) with at least two vinyloxyalkylester groups of the instant application.

15. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sander et al. (US Patent 4,247,611) in view of Hatanaka et al. (WO 03/087941, wherein the citations are from the English equivalent document US Pg-Pub 2005/0147914) as applied to claim 5 and in further view of Pai et al. (US Patent 5,648,194).

With regard to claim 14, Sander modified by Hatanaka teach the composition of claim 5, wherein the composition comprises naphthoquinone-1,2-diazide-4-sulfochloride as radiation-sensitive compound (see paragraph 9 above).

However, Sander and Hatanaka fail to disclose that the positive resist composition may comprise a compound (F) with at least two vinyloxyalkylester groups.

Pai et al. disclose a photoresist composition comprising an alkali soluble resin, an o-naphthoquinone diazide sulfonic acid ester photoactive compound and a vinyl ether compound. The naphthoquinone diazide sulfonic acid is replaced in part with the vinyl ether composition to decrease the concentration of photoactive compound while increasing the photospeed of the composition (abstract and column 3, lines 13-17).

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One of the naphthoquinone diazide sulfonic acid ester used in the composition of Pai et al. is 1,2-naphthoquinonediazide-4-sulfonic acid halide (column 4, line 11), which is equivalent to the naphthoquinone-1,2-diazide-4-sulfochloride of Sander et al.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use a vinylether in the composition of Sander modified by Hatanaka, as taught by Pai et al., in order to decrease the amount of naphthoquinone-1,2-diazide-4-sulfochloride needed for the composition, while maintaining the image resolution and increasing the photospeed (Pai et al., column 3, lines 13-17).

Pai et al. further disclose that the vinylether compound may be bis(4-vinyloxybutyl)isophthalate, bis(4-vinyloxymethylcyclohexylmethyl)glutarate and bis(4-vinyloxybutyl)succinate (column 4, lines 63-65). These compounds are equivalent to the compound (F) with at least two vinyloxyalkylester groups of the instant application.

Response to Arguments

16. In regard to applicant's arguments filed on November 11, 2008, the examiner would like to note that the applicant's arguments have been considered but, in view of the prior art presented above, the pending claims are not allowable.

The examiner apologizes for any inconvenience caused to the applicant and his representative. Therefore, this Office Action is non-final.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANCA EOFF whose telephone number is (571)272-9810. The examiner can normally be reached on Monday-Friday, 6:30 AM-4:00 PM, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cynthia H. Kelly can be reached on 571-272-1526. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

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USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/A. E./

Examiner, Art Unit 1795

/Cynthia H Kelly/

Supervisory Patent Examiner, Art Unit 1795